Claims

1. Nonlinear precoding method based on a modulo arithmetic for the transmit-side preequalization of K user signals to be transmitted at the same time and frequency in a digital broadcast channel with known transmission behavior set up between a central transmitting station and K decentralized, non-interconnected receiving stations, said user signals consisting of data symbols a_k with k from 1 to K from an M_k-level signal constellation having a signal point spacing A_k with a periodic multiple representation of the undisturbedly transmitted data symbols a_k in data symbol intervals congruent for K receive-side modulo decision devices, a transmit-power-minimizing selection of representatives v_k from the range of values $a_k+A_k \cdot M_k \cdot z_{kk}$ where z_{kk} is from the set of integers, and linear preequalization of the selected representatives v_k to form transmit signals x_k to be transmitted,
characterized in that
the interference symbols occurring in the broadcast channel (BC) and superimposed on the data symbols a_k and their periodic multiple representation due to cross-coupled user signals (ST_k) are included in the periodic multiple representation of the data symbols a_k by means of an adapted periodic multiple representation and eliminated by the K receive-side modulo decision devices, the interference symbols between the data symbol a_I with I from 1 to K and not equal to k and the data symbol a_k being assigned periodic representatives from the range of values $A_k \cdot M_k \cdot z_{Ik}$ with z_{Ik} from the set of integers.

2. Nonlinear precoding method according to Claim 1,
characterized in that
mathematically the required transmission behavior of the broadcast channel (BC) is achieved by a factorization of the channel matrix **H** describing the current transmission behavior

and known on the transmit side into a reduced channel matrix $\mathbf{H}_{red}$ to be preequalized and a residual interference matrix **R** according to

$$\mathbf{H} = \mathbf{R}\,\mathbf{H}_{red},$$

the residual interference matrix **R** assuming only the value 1 on the main diagonal and all the other elements being row-wise integral multiples of the level number M_k of the signal constellation used and the reduced channel matrix $\mathbf{H}_{red}$ being obtained by factorization into a matrix **F** with orthogonal columns, a lower triangular matrix **B** and a permutation matrix **P** with the introduction of a receive-side scalar gain factor g according to:

$$\mathbf{P}^{T}\mathbf{H}_{red}=1/g\;\mathbf{B}\;\mathbf{F}^{-1}.$$

3. Nonlinear precoding method according to Claim 1 or 2, **characterized in that**
offset compensation (**o**) is already carried out on the transmit side in the transmit signals x_k to be transmitted.